CASE REPORT

Laparoscopic Transhiatal Treatment of Large Epiphrenic Esophageal Diverticulum

Gianfranco Silecchia, MD, PhD, Giovanni Casella, MD, Carlo Luigi Recchia, MD, Ermanno Bianchi, MD, Nazzareno Lomartire, MD

ABSTRACT

Background: Epiphrenic diverticulum is an uncommon disorder of the distal third of the esophagus. We report the case of a 73-year-old woman with a large symptomatic esophageal epiphrenic diverticulum, diffuse nonspecific esophageal dysmotility, and a hiatal hernia.

Methods: Surgery was indicated by the patient's symptoms, the size of the diverticulum (maximum diameter 10 cm), and the associated esophageal motor disorder. Preoperative study included barium swallow, upper gastrointestinal endoscopy, and esophageal manometry. A laparoscopic transhiatal diverticulectomy associated with a Heller myotomy, hiatoplasty, and a Dor's fundoplication was carried out. The overall operative time was 230 minutes.

Results: No intraoperative complications occurred. Gastrografin swallow performed on postoperative day 4 did not show any signs of leakage from the staple line. The postoperative hospital stay was 5 days. The patient was readmitted 10 days after discharge complaining of fever and chest pain. A new Gastrografin swallow demonstrated a small leak from the staple line successfully treated with 3 weeks of total enteral nutrition.

Conclusion: The laparoscopic approach to epiphrenic diverticulum is feasible. Postoperative Gastrografin swallow is not 100% sensitive in detecting small suture-line leaks if a preexisting esophageal motility disorder is present. In case of late postoperative fever and pleural effusion, a suture-line leak should be suspected. Conservative management of the small suture-line leak should be considered as an effective therapeutic option.

Key Words: Laparoscopic esophageal surgery, Epiphrenic diverticulum, Esophageal diverticulum, Transhiatal approach.

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INTRODUCTION

Epiphrenic diverticulum is an uncommon disorder of the distal third of the esophagus.[1] Esophageal dysmotility, such as achalasia, diffuse esophageal spasm, nutcracker esophagus, and nonspecific motility disorder, may be associated in the majority of patients.[2,3] Symptoms associated with this disorder include dysphagia, regurgitation, heartburn, chest pain, and vomiting often followed by weight loss. Standard treatment of the epiphrenic diverticulum includes diverticulectomy, esophageal myotomy, and fundoplication[4–6] with left thoracotomy being the recommended approach.[2] The high mortality (0% to 11%)[2,5,7] and the postoperative morbidity rate (33–45%)[5,8,9] associated with this approach suggest limiting the surgical treatment to severe symptomatic cases only.

Some authors have proposed the mini-invasive approach (laparoscopy, video-assisted thoracic surgery [VATS], laparoscopy and VATS) as a possible effective alternative to the open technique.[8,10–14] The transhiatal laparoscopic approach avoids pleural drainage, reducing postoperative pain and hospital stay. It also allows an easier esophageal myotomy and antireflux procedure.[13]

We report the case of a laparoscopic transhiatal approach to a large esophageal epiphrenic diverticulum with hiatal hernia.

CASE REPORT

The patient was a 73-year-old woman with large symptomatic esophageal epiphrenic diverticulum that caused severe dysphagia, frequent vomiting, and weight loss (15 kg in the previous 3 months). Preoperative study included barium swallow, upper gastrointestinal endoscopy, and esophageal manometry. The initial diagnosis was performed by barium esophagram, which showed an epiphrenic diverticulum located at the right side of the esophagus and the presence of a concomitant hiatal hernia **(Figure 1A)**. Spiral computed tomography (CT) confirmed the diagnosis. The maximum diameter of the diverticulum pouch was 10 cm with a neck size of 7 cm **(Figure 1B)**. Flexible endoscopy was performed to exclude any diverticular ulceration or neoplastic strictures; the endoscopist identified the neck of the diverticulum at

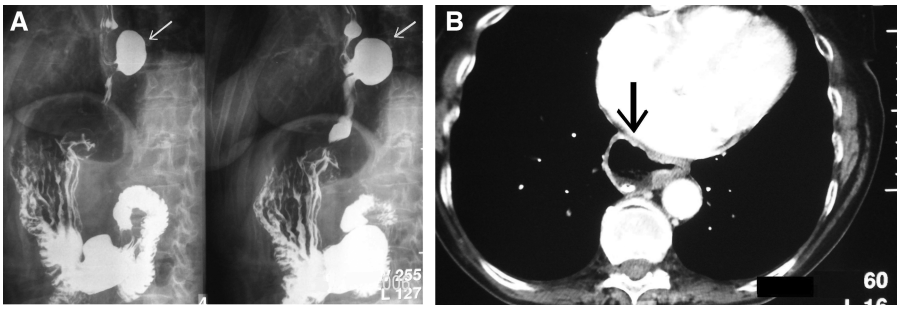

Figure 1. (A) Preoperative contrast study showing a large epiphrenic diverticulum (arrow) and small hiatal hernia. (B) Preoperative spiral computed tomgraphic scan demonstrating an esophageal diverticulum with a large neck.

7 cm to 10 cm from the esophagogastric junction and confirmed the x-ray evidence of hiatal hernia without severe esophagitis **(Figure 2)**. Esophageal manometry showed a diffuse nonspecific esophageal disorder. Three days of a preoperative liquid diet was prescribed to avoid the presence of alimentary material in the diverticulum.

Surgery was indicated by the severity of the patient's symptoms, the size of the diverticulum, and the presence of associated motor abnormalities. Thus, a laparoscopic transhiatal diverticulectomy, Heller myotomy, hiatoplasty, and Dor's fundoplication were planned.

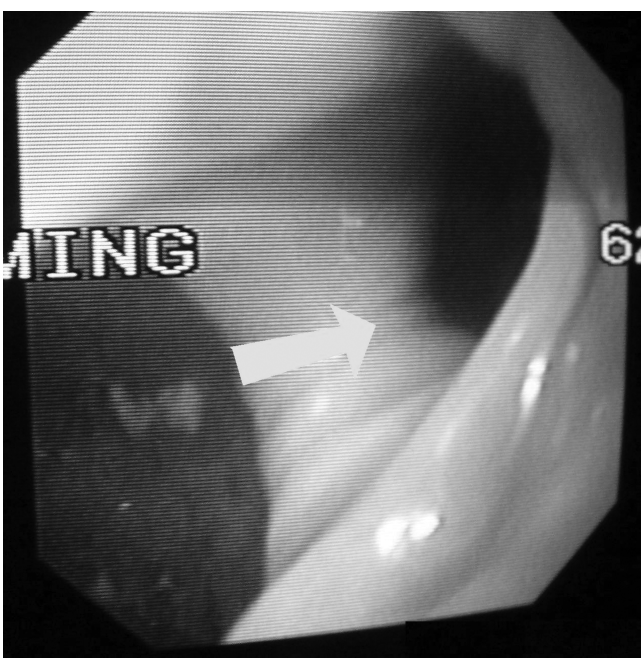

Figure 2. Preoperative flexible endoscopic view of the diverticulum.

Operative Technique

A Carlens dual lumen endotracheal tube was used for general anesthesia in case of left thoracotomy conversion. The patient was positioned in an anti-Trendelenburg (30-degree) supine position with legs spread; the surgeon stood between the patient's legs **(Figure 3A)**. Two 10/12-mm trocars and three 5-mm trocars were placed **(Figure 3B)**. A 10-mm 30-degree video laparoscope was used. The procedure started with mobilization of the gastric fundus and dissection of the left diaphragmatic crus. The dissection of the esophageal hiatus was completed with the opening of the pars flaccida of hepatogastric ligament and isolation of the right crus. The hiatal hernia was identified and reduced into the abdomen. The mobilization of the esophagus was accomplished using the Ultracision Harmonic Scalpel (Ethicon Endo-Surgery, Inc, Cincinnati, OH, USA). Careful attention was paid to identify and preserve the vagus nerve.

Intraoperative flexible endoscopy was helpful in (1) correct identification of the cranial and distal limit of the neck of the diverticulum by transillumination; (2) aspiration of residual food from the diverticulum; (3) helping the dissection by insufflation/deflation of the pouch; (4) identification of the esophageal lumen during the resection of the diverticulum to prevent eventual esophageal stricture; (5) checking for staple line leakage after the diverticulum resection and the esophageal myotomy.

The diverticulectomy was performed using 2 sequential 2.5/45-mm white cartridge linear staplers (EndoGIA, US Surgical Norwalk, CT, USA) according to Tedesco et al.[3] The thickness of the diverticular neck appeared to be suitable for reaching an adequate approximation with the white cartridge. The vascular cartridge guarantied a helpful hemostasis of the approximated tissue line. The stapler was introduced through the 12-mm trocar placed at the left subcostal margin (trocar 2 - **Figure 3B**) and fired with the device

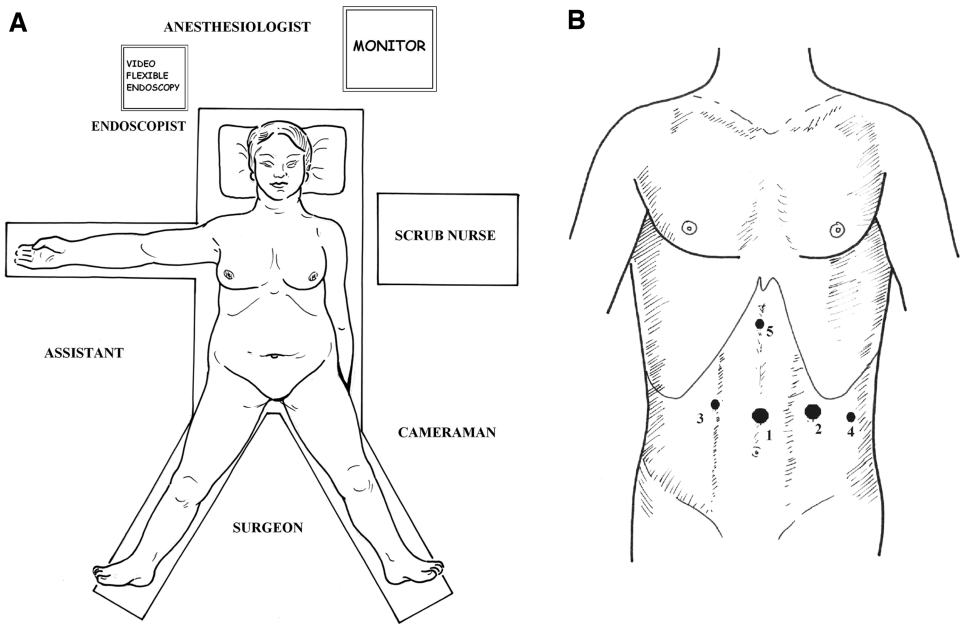

Figure 3. (A) Operative team position; (B) trocar placement.

parallel to the esophagus **(Figure 4A)**. The resected diverticulum was removed in a retrieval bag. A hydropneumatic test was performed and showed no staple line leaks. Fibrin glue (Tissucol 2 mL, Baxter Healthcare Corporation, Vienna, Austria) was applied with a long laparoscopic glue applier to reinforce the staple line. No pleural opening was recorded. The procedure was completed with a standard esophageal myotomy (7 cm to 8 cm on the esophagus along the opposite side of the resected diverticulum plus 3 cm on the stomach), hiatoplasty with 2 nonabsorbable interrupted stitches (Prolene, Ethicon, Inc., Somerville, NJ, USA), and a Dor's fundoplication **(Figure 4B)**. A transhiatal 10-mm Jackson-Pratt drain (Allegiance Healthcare, McGraw Park, IL, USA) was placed into the posterior mediastinum, and a nasogastric tube was left in place.

RESULTS

The overall operative time was 230 minutes. An immediate postoperative chest x-ray was performed to exclude pneumothorax. Gastrografin swallow performed on postoperative day 4 demonstrated integrity of the suture line; **(Figure 5)** therefore, the mediastinal drain was removed and the patient was discharged the next day. A liquid diet was prescribed for 3 days, followed by a soft diet after discharge. The patient did not complain of dysphagia or vomiting. The patient was readmitted for fever (38.5°C) and right chest pain 10 days after discharge. A chest x-ray showed a right pleural effusion, WBC 10,500; spiral CT-scan confirmed a mild right pleural effusion and showed fluid collection above the left lobe of the liver (maximum diameter 5 cm). Gastrografin

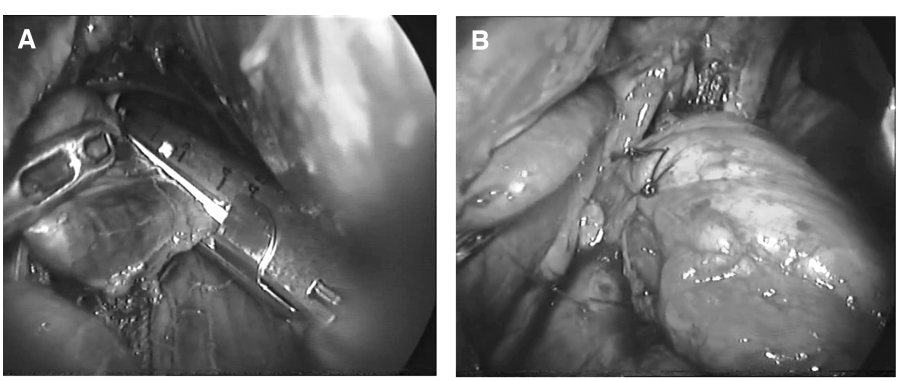

Figure 4. Intraoperative figures (A) diverticulectomy using endoscopic linear stapler; (B) Dor's fundoplication.

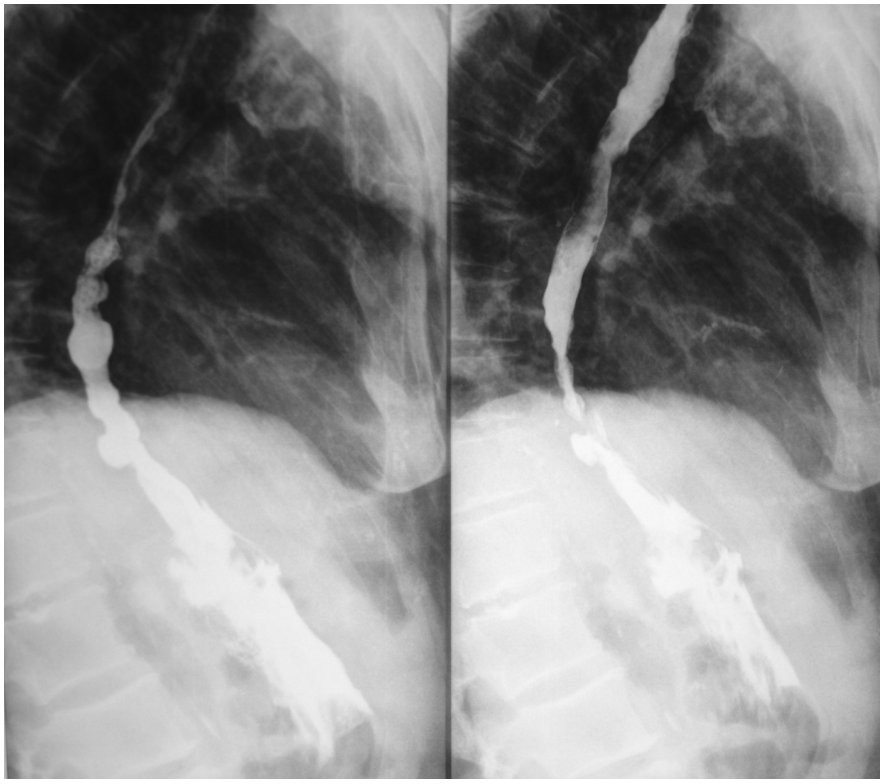

Figure 5. Postoperative contrast study.

swallow, with the patient in a supine position, showed a small leak in the inferior portion of the staple line **(Figure 6)**. The patient recovered after 20 days of total enteral nutrition plus antibiotic therapy and a high IV dose of inhibitor proton pump. Two months after discharge and resumption of a regular diet, the patient underwent a barium swallow that demonstrated the persistence of esophageal motor disorder with regular transit of the barium through the fundoplication. The patient gained 5 kg in 3 months after surgery and did not complain of dysphagia or vomiting.

Figure 6. Gastrografin swallow with the patient in a supine position, showing a small suture line leak.

DISCUSSION

The cause of esophageal epiphrenic diverticulum is generally considered to be pulsion diverticulum, which is thought to develop secondary to increased intraesophageal pressure secondary to motility disorder.[1] Diagnosis based on symptoms related to the diverticulum and those caused by the underlying motility disorder can be difficult.

The therapeutic efficacy of diverticulectomy plus esophageal myotomy and the antireflux procedure is still controversial. Diverticulectomy alone has been associated with increased rates of recurrences and suture line leaks.[5,7]

Even though laparoscopy is considered the "gold standard" treatment for a variety of esophageal diseases including achalasia, hiatal hernia, and severe gastroesophageal

reflux disease,[15–17] the conventional surgical management of the epiphrenic diverticulum is still through a left thoracotomy. We report the case of a large epiphrenic diverticulum and hiatal hernia treated by diverticulectomy, esophageal myotomy, hiatoplasty, and Dor's fundoplication performed with a total laparoscopic approach.

The laparoscopic approach reduces postoperative pain[8,18] and allows easy performance of a Heller myotomy and antireflux fundoplication. Transhiatal diverticulectomy using a linear stapler is feasible and efficacious. Placement of the stapler through the hiatus parallel to the esophagus avoids the creation of stricture when the cartridge is fired.

Intraoperative endoscopy is mandatory to assure the correct identification of the diverticulum, including the exposure of its neck, to prevent any esophageal stricture during the resection and to check for eventual leaks at the end of the procedure.

Suture line leakage is the most commonly reported complication (6% to 23%).[2,5,7–9] Reinforcement of the staple line has been suggested to reduce the leakage rate in laparoscopic surgery.[19] We used biological fibrin glue (Tissucol, Baxter Healthcare Corporation, Vienna, Austria) as reinforcement material.

In the present case, we observed a complication 10 days after the patient's discharge, which suggests the development of a small leak from the staple line a few days after the patient resumed a regular diet. Postoperative Gastrografin swallow, performed on postoperative day 4, did not show any leak or pleural effusion. We believe that the underlying esophageal dysmotility could have played a significant role in the development of this complication and in the missed radiological diagnosis.

We have learned that in case of an epiphrenic diverticulum associated with underlying known esophageal dysmotility when a postoperative pleural effusion/fever appears a few days after discharge a missed small leak of the suture line should be considered.

If a small staple line leak is detected postoperatively, a reoperation is not needed, conservative management with total enteral nutrition and antibiotics being considered efficacious treatment.

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